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INTERNATIONAL JOINT COMMISSION

REPORT
IN THE MATTER OF
THE APPLICATIONS OF THE MICHIGAN
NORTHERN POWER COMPANY
AND
THE ALGOMA STEEL CORPORATION
LIMITED

**FOR APPROVAL OF DIVERSION OF WATER,
CONSTRUCTION OF COMPENSATING WORKS,
AND PLANS THEREFOR, IN THE ST. MARYS
RIVER AT SAULT STE. MARIE**

By MR. MACRATH



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INTERNATIONAL JOINT COMMISSION.

REPORT IN THE MATTER OF THE APPLICATIONS OF THE MICHIGAN NORTHERN POWER CO. AND THE ALGOMA STEEL CORPORATION (LTD.), FOR APPROVAL OF DIVERSION OF WATER, CONSTRUCTION OF COMPENSATING WORKS, AND PLANS THEREFOR IN THE ST. MARYS RIVER AT SAULT STE. MARIE.

The applications as amended are on behalf of two distinct companies, the Michigan Northern Power Co., a corporation organized under the laws of Michigan, and the Algoma Steel Corporation, Ltd., organized under the laws of Ontario. Each seeks the approval of a proposed diversion of water, and of the construction of compensating works, on its own side of the St. Marys River. The minimum amount of water available for power development in excess of that required for navigation is stated to be approximately 60,000 second-feet. Of this amount, one-half or 30,000 second-feet is available for use on the United States side, and an equal amount on the Canadian side of the river. The Michigan Northern Power Co. has applied to the Secretary of War of the United States for a lease of 25,000 cubic feet per second, the balance available on that side of the river having already been leased to the Edison-Sault Electric Co. On the Canadian side, the Algoma Steel Corporation, Ltd., asks for approval of the diversion, either by itself or the Province of Ontario, of 30,000 cubic feet per second. Both applicants, in addition to the above quantities of what is designated as "primary water," ask for a further diversion of water intermittently available, known as "secondary water," not to exceed 5,000 cubic feet per second.

The compensating works for which approval is asked are designed to offset the diversions of water contemplated in the two applications, and are to be so operated as to maintain the level of Lake Superior as nearly as may be between levels 602.1 and 603.6 above mean tide at New York, according to the system of levels established by the United States Government in 1903. (All subsequent statements as to water levels are to be understood as referring to this datum.) The plans for these compensating works attached to each application are identical. They consist of a dike running parallel to the international bridge and about 150 feet therefrom on the upper

side of the stream, and 16 sluices or movable gates, the whole extending northward from the United States Government dike opposite Pier No. 4 of the international bridge, across the boundary to the Canadian shore. The dike is to be 225 feet in length. Of the 16 sluices, 8 are to be built by the Michigan Northern Power Co., and 4, in addition to the 4 already in place, by the Algoma Steel Corporation. Some confusion developed in the course of the testimony by reason of the fact that the approval asked for by each applicant was for that portion only of the complete work which would lie on its own side of the international boundary, and that the exact location of the boundary had not yet been fixed by the International Waterways Commission. It has been assumed for the present that 8 of the 16 sluices will be located in the United States waters and 8 in Canadian waters.

I.

The original application on the United States side was made by Clarence M. Brown, receiver of the Michigan Lake Superior Power Co., a corporation organized in 1898 under the laws of the State of Michigan, and is for the approval of proposed lease with the United States, and of diversion of water, construction of compensating works, and plans therefor, and all acts authorized in said lease.

The application sets forth the power conferred upon the company under the terms of act No. 39 of the Legislature of the State of Michigan, 1883, which powers are substantially the right to build a canal or canals from a point above the Falls of the St. Marys River in the city of Sault Ste. Marie, Mich., to a point on said river below the Falls, within the limits of said city, the development and sale of water power, and the right to divert water from the St. Marys River into its power canal upon obtaining the consent of the Board of Supervisors of Chippewa County, Mich., which consent was duly obtained on the 10th day of October, 1898. Pursuant to the authority so conferred the company constructed a power canal with the necessary works appurtenant thereto, substantially in accordance with the plan attached to the present application.

II.

Under the terms of "An act making appropriation for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," 1902, Congress authorized the company, with the consent of the Secretary of War and the Chief of Engineers, to divert water from the St. Marys River into its water-power canal "while and so long as such works and diversion of water from said river shall not injuriously affect navigation therein, nor impair or diminish the water levels, or any natural increase thereof, either

in Lake Superior or in the United States Ship Canal and locks, or the navigable channels, locks, or ship canals connected therewith, whether natural or artificial, now existing or which may hereafter be established or created by the United States for navigation purposes." The company was further required to "establish, maintain, and operate suitable and sufficient remedial and controlling works in the rapids of said river subject to the approval of the Secretary of War and the Chief of Engineers." It was further required to maintain and operate the canal and works "in accordance with any rules and regulations that may hereafter be recommended by any international commission and that shall become operative."

Pursuant to the provisions of the above act the Secretary of War and the Chief of Engineers duly approved of the proposed canal and remedial works, and consented to the diversion of water, upon certain conditions set forth in a permit dated December 12, 1902.

III.

By act of Congress approved March 3, 1909, entitled "An act to provide for the repair and maintenance and preservation of public works on rivers and harbors, and for other purposes," that part of the act of 1902 authorizing the works of the company was amended by adding, among other things, the following: "The right to the flow of water, and riparian, water power, and other rights, now or hereafter owned by the United States, in the St. Marys River in Michigan, shall be forever conserved for the benefit of the Government of the United States, primarily for the purposes of navigation and incidentally for the purpose of having the water power developed, either for the direct use of the United States, or by lease or other agreement, through the Secretary of War." Provision was made for a "just and reasonable compensation" for "the use of all waters or water power now or hereafter owned in said St. Marys River by the United States." It was further provided that "under no circumstances shall any rights be granted in said river which will interfere with the needs and uses of navigation, or which shall limit the absolute control of said land and waters when desired for purposes of navigation by the United States, or for a longer period than thirty years."

Attached to the application is a draft of the lease proposed to be issued under the terms of the act of 1909. Certain amendments introduced during the course of the proceedings will be referred to later. The draft lease in its original form provides that the company is to have for a period of 30 years, subject to the right of the Government of the United States to diminish at any time and for any period and by any amount the quantity of water available for its use for power purposes, a continuous flow of water from the St. Marys

River above the rapids "in such quantity up to a maximum daily aggregate at the average rate of 25,000 cubic feet per second as shall from time to time be required by the lessee"; that the company is to build in the rapids of the St. Marys River "such compensating and remedial works as may be necessary for the reasonable control of the level of Lake Superior or for the safety of navigation according to plans submitted to the lessor by the lessee and approved by the lessor." These plans show the work in question as a dike about 575 feet long, and 10 sluices or movable gates (4 of which have already been built on the Canadian side) each about 52 feet wide, extending from the United States Government dike north to the Canadian shore. The application is for approval of so much of these works as will lie on the United States side of the boundary. On March 5, 1914, certain modifications of the original plans were approved by the War Department, eliminating about 350 feet of the dike and providing additional gates, of which 8 it is stated will be on the United States side and 8 on the Canadian side of the international boundary. However, as the boundary in the St. Marys River has not yet been definitely marked, it is not possible to state positively what proportion of the proposed compensating works will be in Canadian and what proportion in United States territory.

The draft lease provides that the total cost of the compensating works on the United States side of the river is to be borne in the first instance by the Michigan Northern Power Co., which is to be reimbursed by the Government with interest at 5 per cent per annum, such reimbursement to be made by deducting the amount out of water rentals as they accrue from time to time. The cost of maintenance and operation of the compensating works is also to be borne by the company and repaid from water rentals in the same way. Upon the repayment in full of the entire cost of the works, with interest as provided in the lease, the compensating works are to become the property of the Government.

The company is required, on or before the completion of the compensating works, to proceed to repair and strengthen its power house and fore bay so that they will be capable of handling the quantity of water leased with the greatest head at which it can be delivered by the water-power canal. Until the fore bay and power house are strengthened, and the compensating works completed, the company is permitted the use of not more than 15,000 cubic feet of water per second, or such portion thereof in excess of 10,500 cubic feet per second as will be equivalent to the amount of flow in the rapids obstructed by the works in place from time to time. At the same time the company is required to discharge through its water-power canal and plant such surplus amounts as may be necessary from time to time for the purpose of restraining the undue rise of water in Lake Superior

and assisting in the regulation of its level in the interest of navigation. The company, pending the completion of the compensating works and the strengthening of the fore bay and power house, is to pay the Government a monthly rental for use of water at the rate of \$1,000 per annum. After the completion of the works, as above mentioned, the company is to pay rental at the rate of \$2.50 per cubic foot of primary water per second per year. If secondary water intermittently available is asked for by the company, it is to pay for the use of such secondary water at the rate of \$1 per cubic foot per second per year.

The application, as originally filed, is for approval of the lease referred to above as well as of the accompanying plans, also for approval of the construction and operation of the works in accordance with the plans submitted and as provided in the lease, and the diversion through the power canal and the use in the power house proposed to be built by the company of the waters to the extent and in the manner provided in the lease.

The application was transmitted to the commission on June 14, 1913, by the United States Secretary of State "for consideration and action," and the accompanying letter from the War Department states that "action by the War Department will be held in abeyance pending a report of the action taken by the commission." On November 22, 1913, the State Department communicated a letter from the Secretary of War concurring in the views of the commission, that approval by the War Department should precede action by the commission, and transmitting a set of the plans filed in connection with the application, on which had been indorsed the approval of the Chief of Engineers, as well as that of the Secretary of War.

On October 7, 1913, the Michigan Northern Power Co. petitioned to be substituted as applicant in the place of Clarence M. Brown, receiver of the Michigan Lake Superior Power Co., and an order was issued by the commission to that effect.

IV.

A copy of the original application was transmitted to the Government of the Dominion of Canada on July 2, 1913, and a statement in response, dated August 28, 1913, was filed on behalf of that Government. This statement, after discussing various features of the application and of the proposed lease, submits that any approval of the application or any part thereof should be made subject to the following conditions:

1. Such modifications as may be necessary or desirable to render the character of the compensating and remedial works and the operating provisions of the draft lease amply sufficient to protect the interests of navigation at all points, both under normal conditions and under such abnormal conditions as can be foreseen.

2. Complete regulation of the whole discharge of the river.
3. The establishment of suitable rules to govern the regulation of the levels of Lake Superior and the level of the river below the rapids within such limits as may be found expedient, with provision for such changes as may become necessary or desirable from time to time.
4. An appropriate system of joint control.
5. An agreement or agreements capable of enforcement for the completion of the whole works within a specified time after request.
6. An estimate of the total amount of water available for power purposes, computed after complete investigation.
7. Provision that the diversion in whole or in part of one-half of such estimated amount by either country shall be subject to the mutual right of the other country, to the other one-half, and that any diversion is subject to the amount now or hereafter required by both countries for navigation, locking facilities, and the like.
8. Approval and protection of the right of Canadian interests to create means of diversion for one-half of the water available for power development.
9. Such further or other conditions as after further investigation of the subject matter of the application may be found proper to submit to your honorable commission.

V.

In October, 1913, the Michigan Northern Power Co. filed its statement in reply to the statement in response of the Government of Canada. The company in its reply substantially agrees to the principles embodied in the proposed conditions suggested on behalf of the Government of Canada, but submits that the provisions of the draft lease amply protect the interests of navigation, and that the right of Canada to the use of one-half of the water available for power development should be based upon an appropriate application on behalf of Canadian interests rather than made a condition of the approval of the application of the Michigan Northern Power Co.

VI.

A statement in response, dated November 3, 1913, to the original application, was filed on behalf of the Province of Ontario. The statement sets forth that the Province of Ontario is the owner of the bed of the St. Marys River and of the water power and waters thereof on the Canadian side of the international boundary, and that it intends to utilize one-half of the water of the river which may be available for the development of power. It asks that approval of the application be conditioned upon a definition of the term "primary water" as "that portion of the outflow from Lake Superior which shall be considered as being continuously and permanently available for power purposes"; on the limitation of the amount of such primary water to 60,000 cubic feet per second, of which amount 30,000 cubic feet per second is to be permanently available for use in Canada, and an equal amount for use in the United States; on an agreement on the part of the United States that "under no circumstances at any

time hereafter will the United States itself use for power purposes, or allow the use for power purposes, on the part of its lessees or others, by diversion or any other means in either case, of an aggregate of more than 30,000 cubic feet per second of primary water flowing out of Lake Superior by way of the natural channel of the St. Marys River, or by way of any artificial raceways, canals, or channels which may now or in the future exist, in, along, or in the vicinity of the St. Marys Rapids"; and, finally, on certain changes in the layout of the remedial works.

The changes proposed in the remedial works make the statement in response to that extent equivalent to an original application, and dealing with this feature at the Washington meeting, the chairman (Mr. Tawney), said:

The statement in response on behalf of the Province of Ontario is in the nature of an original application for approval by the commission of an obstruction and use of part of the waters of the St. Marys River at the Sault wholly different and apart from the obstructions contemplated in the application of the Michigan Northern Power Co., or in the application of the Algoma Steel Corporation (Ltd.).

It is true the proposed obstruction and use on the part of the Province of Ontario is presented under the rules of the commission in its statement in response to the application of the Michigan Northern Power Co., but the commission is asked by the Province to include, as a condition of its order of approval, the approval of its proposed obstruction and the plans submitted therefor. But this does not change the fact that it is an application for our approval of a proposed obstruction in the St. Marys River—a boundary water. If, therefore, the commission should grant the prayer of the Province of Ontario, we would thereby create and grant to it an affirmative right to construct and maintain its proposed works, and this the commission has not the power under the treaty to do as a condition of its order of approval of another application. The power of the commission under the treaty to impose conditions precedent in granting its approval of any application is limited to matters wholly negative, such as requiring protective works, in addition to those proposed by the applicant or indemnity for injury on either side of the boundary that can not be compensated for by additional protective works.

To consider the condition proposed by the Province as a condition of our approval of either application would, therefore, in effect, be granting its application for an obstruction in these waters independent of the obstruction contemplated under either of the other two applications. This could not be done for another reason, which is that the obstruction proposed by the Province of Ontario is not authorized by the Dominion Government as required by the treaty, nor are the plans under which the proposed obstruction is to be erected finally approved by the proper authorities of the Dominion Government. * * * If any additional obstruction of the waters of the St. Marys River is hereafter proposed that would in any way affect the levels of Lake Superior, it would have to be on an original application.

VII.

Under date of January 27, 1914, the Michigan Northern Power Co. filed its statement in reply to the statement in response of Ontario. The company agrees to the definition of "primary water"; objects to the arbitrary limitation of the amount to 60,000 cubic feet per second;

and objects to any question as to the equal division of such primary water between the two countries being made a condition to the approval of its application.

VIII.

In February, 1914, a brief was filed on behalf of the Government of the United States; also statements in reply to the statements in response of the Dominion of Canada and the Province of Ontario. The brief sets forth among other things that the United States "has lawfully acquired the ownership and possession of all the lands and property of every kind and description in and along the rapids of the St. Marys River, north of the St. Marys Falls Ship Canal throughout its entire length, and lying between the said ship canal and the international boundary at Sault Ste. Marie, Mich.;" and that, in addition to the ownership of the lands, both upland and subaqueous, and other property acquired as aforesaid, it is "vested with the control of all the waters flowing in the St. Marys River within its own domain, and with the right to appropriate and use such waters subject and in conformity to existing treaty limitations and obligations, in any lawful way and for any lawful purpose"; that Congress has enacted that the rights of the United States to the flow of water in the river "shall be forever conserved, primarily for the purposes of navigation, and incidentally for the development of power," and that the Secretary of War is vested with authority to lease for power purposes any surplus water over and above the amount required for navigation; that a lease has heretofore been executed for the use of approximately 5,000 second-feet, leaving a minimum of approximately 25,000 second-feet available; that the applicant herein has applied to the Secretary of War for a lease of so much of the surplus water belonging to the United States as he may be willing to grant; that under the terms of the treaty proclaimed May 13, 1910, the "lease project" requires the approval of the commission; that the compensating works, if authorized and built, will be located wholly in American waters, on land belonging to the United States, their construction although intrusted to the company will be supervised by the Government of the United States, the cost ultimately borne by that Government, and the works themselves would eventually become the property of the United States; that therefore, although the application is by a private corporation, the Government of the United States is vitally interested therein and would naturally protect its own interests, and that the main question for consideration by the commission is "whether diversion of water may be made and whether the proposed compensating works can be built and operated without injury to the interests of Canada." The hope is expressed that the commission "would recommend the joint control of the regulating works and establish at

least a basis for the formulation of tentative rules for such control," and that the formulation of tentative rules for the consideration of the commission, and the subsequent joint control of the works, should be in the hands of "duly authorized representatives of the two Governments."

In reply to various objections offered in the statements in response, it is alleged on behalf of the United States that the present plans are adequate to care for the maintenance of levels in the lower river; that to avoid any undue delay in the execution of the works the lease has been revised so as to provide for their completion within a period of about three years; that the suggested definition of the term "primary water" is satisfactory to the United States, subject, however, to the right of the United States and the Dominion of Canada to use any of the water of the river for navigation, or for other prior uses, such as domestic and sanitary purposes; that while objection is seen to fixing the amount of primary water at 60,000 second-feet, "it is manifest that the minimum amount that will be available for power purposes at any and all times will be the minimum river discharge diminished by the amount needed for navigation," and "this latter amount will change from time to time with the improvements made in the interests of navigation and likewise with the seasons of the year"; that the Government of the United States is not willing to fix definitely and for all time the specific quantity of water to be used, but seeks only the right to use one-half the total amount available.

In regard to the terms of the treaty providing that "the high contracting parties shall have each on its own side of the boundary equal and similar rights in the use of the waters hereinbefore defined as boundary waters," and the effect thereon of the Senate resolution appended to the treaty, it is stated on behalf of the United States that "since this treaty, as thus amended, was adopted and proclaimed, the Government of the United States has come into possession and ownership, in fee simple, of all the lands and property of every description, including the submerged lands, and the waters flowing over them, on its side of the international boundary line. This, it is understood, virtually meets the spirit and intent of the Senate resolution, and removes the restriction imposed by it on the treaty, so that the foregoing original provision with respect to an equal division of water applies to the St. Marys River as well as to other boundary streams. The relative rights of the two countries in the division of these waters being thus fixed by the treaty itself, the question is not within the jurisdiction of your honorable commission. Each Government has the right to the use and enjoyment, on its own side of the boundary, of one-half of the waters of the

river, but each must so exercise its right as not to invade or impair that of the other. The United States desires only to exercise its right to use its half of the waters available for power purposes in accordance with this principle, and no objection will be made to a similar exercise by the Dominion of Canada of its right in this regard. Any order or recommendation which your honorable commission may conceive to be appropriate and necessary to secure to each Government the full use and enjoyment of its property will be cheerfully complied with."

In conclusion it is suggested on behalf of the United States that to any sanction which the commission might see fit to give to the building of the proposed compensating works, conditions should be attached which would—

- (a) Fix as nearly as may be the levels between which it may be desirable to endeavor to maintain the level of Lake Superior.
- (b) Provide for the proportional reduction of the amounts of water used for power purposes on both sides of the boundary line in case the compensating works as built fail to maintain the lake level at or above the lower limiting figure.
- (c) Provide for the modification of the works in case they fail to prevent the undue rise of the lake levels.
- (d) Provide for the joint control and operation of the compensating works built on both sides of the international boundary, subject to the approval of the proper authorities of the two Governments concerned.
- (e) Provide for a proper division between the United States and the Dominion of Canada of the cost of ascertaining the water levels affected by the compensating works and the cost of maintaining and operating these works.

IX.

Under date of October 7, 1913, the Algoma Steel Corporation, organized in 1907 under the laws of the Province of Ontario, filed an application for the approval of the construction of compensating works in the St. Marys River at Sault Ste. Marie. This application was transmitted to the commission by order in council of January 10, 1914, "for consideration." On March 5, 1914, an order in council was passed approving of the plans of the Algoma Steel Corporation, subject to the following conditions:

1. That the company shall furnish legal evidence that it has the right to use the site of the said works.
2. Full control of the works and the discharges on the Canadian side of the boundary line is to be vested in the department of public works, or as directed by the International Joint Commission, and all expenses for upkeep of the works are to be borne by the company.
3. That the works shall be completed on the Canadian side of the boundary line within three years from the date of the approval of the plans.
4. That the Government of the Dominion of Canada may take over the works on the Canadian side of the boundary line at any time, on terms to be arranged between the company and the Government, or by expropriation.

5. That the Provincial Government of Ontario may at any time make such alterations and additions to the works on the Canadian side of the boundary line, at its own cost, as may be called for in connection with the development of power, as shown on the plan submitted with the statement in response on behalf of the Province of Ontario, dated November 3, 1913, which was filed with the International Joint Commission when the matter was before the commission.

The application sets forth that the Algoma Steel Corporation is the owner of certain compensating works in the bed of the St. Marys River, consisting of a crib and rock and earth fill dam above the tenth span of the international bridge, and of four steel sluice gates operated between masonry piers above the ninth span of the said bridge, all on the Canadian side of the river; that it is proposed to construct additional compensating works extending southerly from the present works practically to the international boundary, to correspond in design, size, and character of construction with and to be located exactly opposite to the compensating works proposed to be constructed by the Michigan Northern Power Co.

The plans accompanying the application are identical with those of the Michigan Northern Power Co. as originally filed, which, as already stated, provide for a dike of approximately 575 feet, and a series of sluices or gates 10 in number, of which 4 on the Canadian side of the boundary have already been built. These 4 gates are above the ninth span of the international bridge. Approval is asked of the construction of the proposed works and of the plans therefor attached to the application.

X.

The Michigan Northern Power Co. filed on March 5, 1914, a statement in response to the above application. The respondent substantially asks that approval of the compensating works proposed to be built on the Canadian side of the St. Marys River by the Algoma Steel Corporation should be subject to the following conditions:

That the same rules and regulations and the same methods of joint control should apply to these works as to those proposed to be built on the United States side of the river; that the Canadian works should be maintained in such manner that there would be no impairment in their discharge capacity for regulating purposes; that any modifications in the plans of the works on the United States side made necessary for the due maintenance of water levels should be accompanied by corresponding modifications in the plans for the works on the Canadian side; and that in the event of the proposed compensating works on the two sides of the river failing to maintain lake levels or the levels and flow of the St. Marys River in accordance with any rules and regulations established by the commission, "such alterations in or additions to the proposed compensating works on the Canadian side be required to be made as will equitably divide the burden of such maintenance of levels and river flow between the interests on the Canadian side and the interests on the American side of the international boundary."

XI.

On March 10, 1914, the Algoma Steel Corporation moved for leave to amend its application by adding thereto a request for the approval of diversion of water from the St. Marys River "to an aggregate maximum including the amount of water heretofore permitted of 30,000 cubic feet per second, and in addition thereto of a further flow of water that may be intermittently available for power purposes up to an aggregate maximum of 5,000 cubic feet per second." On April 7, 1914, the application was further amended as follows: "Provided that nothing herein shall be so construed as to prejudice the Province of Ontario or any right it now has in said river or in the obstruction and use of the waters therein on the Canadian side of the boundary. Nor shall this order prejudice the government of Ontario or any person or company in any application it may hereafter make for the construction of any works in the river."

XII.

The United States Department of State on March 16, 1914, communicated to the commission a letter from the Secretary of War approving certain changes in the original plans of the Michigan Northern Power Co. designed to harmonize them with those of the Algoma Steel Corporation, and generally to consolidate the two projects; and on April 7, 1914, the Michigan Northern Power Co. petitioned for leave to amend its application so as to substitute the amended plans as approved by the Secretary of War for those filed with the original application, and for leave to withdraw the request for approval of the lease.

The two applications may now be regarded as one for a complete structure across the river, the cost of that portion south of the international boundary to be defrayed by the United States interests and of that portion north of the boundary by the Canadian interests. The amended project is for the construction of compensating works by the Michigan Northern Power Co. and the Algoma Steel Corporation, these works as already stated to consist of a dike approximately 225 feet in length, and 16 sluices or gates, the whole extending in a northerly direction from the United States Government dike to the Canadian shore.

XIII.

The commission has held two hearings in connection with the applications, the first in the city of Detroit on March 9 and 10, 1914, and the second in the city of Washington on April 7, 8, and 9, 1914.

At the Detroit meeting the following appearances were entered:

Hon. Nathaniel C. Sears and Mr. Edward S. Whitney, of Chicago, Ill., and Mr. Clarence M. Brown, of Philadelphia, Pa., representing the Michigan Northern Power Co.

Mr. Thomas Gibson, of Toronto, Mr. Henry Holgate, of Montreal, and Mr. K. W. Perry, of Sault Ste. Marie, representing the Algoma Steel Corporation.

Mr. George W. Koonce, of Washington, D. C., and Lieut. Col. Mason M. Patrick, Corps of Engineers, United States Army, of Detroit, Mich., representing the United States Government.

Mr. C. S. MacInnes, K. C., of Toronto, Mr. W. J. Stewart, chief hydrographer, department of naval service of Ottawa, and Mr. S. J. Chapleau, of the public works department, Ottawa, representing the Dominion of Canada.

Mr. George Lynch-Staunton, K. C., of Hamilton, Canada, and Mr. H. G. Acres, of Toronto, representing the Province of Ontario.

Mr. R. H. M. Temple and H. K. Wicksteed, of Toronto, representing the Canadian Northern Railway and the Duluth, Winnipeg & Pacific Railway.

Mr. Richard L. Kennedy, of St. Paul, Minn., representing the Chicago, St. Paul, Minneapolis & Omaha Railway Co. and the Clarkson Coal & Dock Co.

Mr. Edward C. Chapin, of Lansing, Mich., representing the Minneapolis, St. Paul & Sault Ste. Marie Railway Co.

Mr. G. F. Lyons, of St. Paul, Minn., representing the Northern Pacific Railway Co.

Mr. Albert H. Comstock, of Duluth, Minn., vice president of the Marshall-Wells Fargo Co., representing the Board of Trade of Duluth; the Commercial Club of Duluth; the Duluth, Missabe & Northern Railway Co.; the Marshall-Wells Fargo Co.; and the Fidelity Investment Co. of Maine.

Mr. Francis King, of Kingston, Ontario, representing the Dominion Marine Association.

Dr. D. A. Reed, of Duluth, Minn., representing the municipality of the city of Duluth, in relation to its waterworks and power systems and other public improvements.

Mr. S. C. Young, mayor of Fort William, Ontario, representing the people of Fort William.

In addition to the above, the following additional appearances were entered at the Washington meeting:

Hon. William Livingstone, representing the Lake Carriers' Association.

Mr. W. H. Hoyt, Duluth, Minn., representing the commercial interests of the municipalities of Duluth and Superior.

Mr. S. F. Handy, mayor, and Mr. F. D. McDonald, city engineer, of Sault Ste. Marie, Mich., representing the municipality of Sault Ste. Marie, Mich.

Mr. C. N. Kalk, of Minneapolis, Minn., representing the St. Paul & Sault Ste. Marie Railway Co.

Mr. L. T. Michener, of Washington, D. C., representing the Grand Trunk Pacific Railway Co.

The above list of appearances at Detroit and Washington suggests the magnitude and importance of the interests affected or that might be affected by the construction of the proposed works in the St. Marys River. These interests may be divided into two great groups, navigation interests and riparian interests. To these must be added the power interests responsible for the applications. The broad problem before the commission is to render a decision that will do substantial justice to all three.

XIV.

The commission has in fac. before it two distinct propositions: First, a request for water diversion for power purposes, which is primarily for the benefit of the applicants; and, secondly, a request for compensatory works, which is essentially in the public interest. The former may fairly be considered on its merits. The latter involves the broad questions of navigation and commerce on the Great Lakes and the protection of public and private property around the shores of Lake Superior. It may serve a useful purpose to outline briefly the character and extent of these interests, taking them in following order: (a) Navigation, (b) riparian, (c) power.

XV.

(a) Navigation and commerce, as here understood, include not only the immense traffic east and west between Lake Superior and the lower Lakes, but also, apart from their riparian interests, the municipalities around Lake Superior, whose existence depends largely upon lake traffic, and the great railway systems and private interests which connect with or are dependent upon that shipping. Comparatively slight changes in the levels of Lake Superior might work very serious damage to all these great interests.

The growth and extent of the traffic through the canals at Sault Ste. Marie may be appreciated from the fact that the tonnage has increased from 106,296 in 1855 to 57,989,715 in 1913, and that the freight carried increased from 14,503 tons in 1855 to 79,718,344 tons, valued at \$865,957,838, in 1913. The shipping charges on this freight in the latter year amounted to \$44,380,865, or an average cost per ton for transportation of \$0.56, and the total valuation placed on registered vessels passing through the canals was \$142,421,200. The net tonnage through the Sault Ste. Marie canals in 1913 was about three times that of the Suez Canal.

Without desiring to go too far afield, it may not be without interest to note the important influence of lake shipping on railway rates. To take a single instance, in 1912, the last year for which comparative statistics are available, the average rates per bushel on wheat from

Chicago to New York were, by lake and canal, 5.57 cents, by lake and rail, 6.17 cents, and by all rail, 9.50 cents. The extent of the reduction in 40 years will be seen by the figures for the year 1872, which were, respectively, 24.47 cents, 28 cents, and 33.5 cents. It is a reasonable assumption that the present low water rates have had some influence in securing the reduction of rail rates to 9.60 cents per bushel.

XXVI.

(b) The riparian interests concerned in the proposed works in the St. Marys River are the cities and towns on Lake Superior, American and Canadian, including those at the outlet of the lake, and to a very limited extent those below the outlet, and the railway and other corporations holding property that would be adversely affected by an increase in the levels of Lake Superior. The municipalities in question have a total population of about 250,000, and the value of their taxable property is estimated at about \$125,000,000. The most important of these lake ports are Duluth, Superior, Fort William, Port Arthur, Marquette, Ashland, and the two towns of Sault Ste. Marie. The railway systems more or less directly interested are: On the Canadian side, the Canadian Pacific Railway Co., the Canadian Northern Railway Co., and the Grand Trunk Pacific Railway Co.; and on the United States side, the Northern Pacific Railway Co., the Minneapolis, St. Paul & Sault Ste. Marie Railway Co., the Chicago, St. Paul, Minneapolis & Omaha Railway Co., and the Duluth, Missabe & Northern Railway Co. These companies, as well as various commercial organizations in Duluth, Superior, Fort William, Port Arthur, and other lake towns are the owners of docks, warehouses, elevators, and other property on the lake front valued at many millions of dollars.

The testimony offered at Detroit on behalf of the municipalities and railway corporations made it apparent that they were seriously concerned as to the effect of the proposed works in the St. Marys River on their property. There was a widespread apprehension that the works would have the effect of raising the level of Lake Superior to such an extent as to flood docks and warehouses in the towns at the western end of the lake, which in many cases are built with very little margin over the existing level, and that very serious damage would be caused to the drainage system of Fort William, which stands on low-lying land. This apprehension was to a large extent removed by the evidence of the engineers of the United States and Canadian Governments, who stated positively that the proposed compensating or remedial works, if approved, would, under the contemplated system of joint control, have a tendency to improve existing conditions instead of making them worse. As a further means of meeting the objections advanced by the municipalities and

other interests, it was decided at the Detroit meeting to postpone the final decision to a later date, and in the meantime to request the engineers representing the Governments of the United States and Canada to draft tentative conditions for consideration in connection with the order of approval, designed to further safeguard the interests on Lake Superior. These tentative conditions were communicated to those representing the municipalities and corporations, with the result that they expressed themselves at the Washington hearing as content to waive any objections to the proposed works on the understanding that if approved their operation would be absolutely under international control.

The tentative conditions as submitted to the commission at Washington are as follows:

- (1) The works to be built in the St. Marys River by the Michigan Northern Power Co., its successors or assigns, shall consist of a dike about 200 feet long and eight Stoney sluice gates and their appurtenances, each gate to be about 50 feet in the clear, and between the northern terminus of this gate system and the system of four gates now in place in Canadian waters there shall be left an interval sufficient to be filled by four Stoney sluice gates, each of the same size as those above mentioned.
- (2) The works to be built in the St. Marys River by the Algoma Steel Corporation (Ltd.), its successors or assigns, shall consist of four Stoney sluice gates and their appurtenances, each gate to be about 50 feet in the clear, and this gate system is to connect with the system of four gates already in place in Canada and with the gate system which the Michigan Northern Power Co. is to build under condition (1) above.
- (3) The sills of all Stoney gates on both sides of the international boundary shall not be higher than 591.2 above mean tide at New York, according to the system of levels established by the United States in 1903, and the river bed, both upstream and downstream from the works to be built, shall be excavated to elevation 590.7 or lower.
- (4) All the detailed plans for the structures to be built by the Michigan Northern Power Co., its successors or assigns, and the order in which they are to be built shall be subject to the approval of the Secretary of War of the United States, or an officer duly designated by him.
- (5) All the detailed plans for the works to be built by the Algoma Steel Corporation (Ltd.), its successors or assigns, and the order in which they are to be constructed shall be subject to the approval of the governor general in council of the Dominion of Canada, or an officer duly designated by him.
- (6) The dike now in place above the four sluices already built and owned by said Algoma Steel Corporation (Ltd.) shall be removed forthwith by the said Algoma Steel Corporation (Ltd.), its successors or assigns, and the said gates shall be put in service.
- (7) All compensating works heretofore built and all such works built under this order of approval and all power canals, including their head gates and by-passes, shall be so operated as to maintain the level of Lake Superior as nearly as may be between levels 602.1 and 603.6 above mean tide at New York, according to the system of levels established by the United States Government in 1903, and in such manner as not to interfere with navigation. The operation of all the said works, canals, head gates, and by-passes for the above purposes shall be under the direct control of the board hereinafter designated.
- (8) The mean elevation of Lake Superior shall be ascertained by taking the mean of the readings of at least four automatic gauges, half the number to be maintained by the United States, half by Canada; these gauges to be located so that their combined readings will indicate as nearly as may be the mean or average condition of the whole

lake. The records of these gauges shall be furnished to the board charged with the control of the compensating works and hereinafter referred to, at such intervals as it may require.

(9) The officer of the Corps of Engineers charged with the improvement of the falls of the St. Marys River on the American side and an officer duly appointed by the Canadian Government shall form a board, whose duty it shall be to formulate rules under which the compensating works and power canals and their head gates and by-passes shall be operated to secure as nearly as may be the regulation of Lake Superior as set forth herein. It shall be the further duty of this board to see that any rules or regulations now or hereafter made by proper authority are duly obeyed.

(10) To guard against unduly high stages of water in Lake Superior, the rules formulated by the said board, when tested by the physical conditions which existed during any year of recorded high water in Lake Superior, when the monthly mean elevation of Lake Superior exceeded 603.6, shall give no monthly mean level of the lake greater than the maximum monthly mean actually experienced in said year.

(11) To guard against unduly high stages of water in the lower St. Marys, the excess discharge at any time over and above that which would have occurred at the stage of Lake Superior prior to 1887 shall be restricted so that the elevation of the surface immediately below the locks shall not be greater than 584.5.

(12) Each power company shall keep continuous records satisfactory to the board, which will show the quantity of water used by it, and shall furnish to the board, on request, full information from said records.

(13) At all times the board will determine the amount of water available for power purposes. It will cause the amount of water so used to be reduced when, in its opinion such reductions are necessary in order to prevent unduly low stages of Lake Superior, and will fix the amounts of such reductions: *Provided*, That whenever the monthly mean level of the lake is less than 602.1 the total discharge shall be no less than that which it would have been at the prevailing stage of Lake Superior discharge conditions which obtained prior to 1887: *Provided further*, That whenever the primary water on either side of the river is reduced, the use of all secondary water shall be discontinued.

(14) If the compensating works constructed in accordance with the plan approved, together with those already constructed, can not be operated so as to regulate the level of Lake Superior, as provided herein, the board shall so alter the works so as to provide for a greater flow, and in a manner satisfactory to the Canadian Government. Whenever it is required that the said works shall be so altered, the greater flow shall be secured in equal parts on each side of the boundary line or the cost of the total greater flow shall be borne equally by the owners of the two parts of the works.

(15) The board herein constituted shall guard against any undue rise of Lake Superior during the construction of the compensating works by requiring the power companies to pass through their respective canals quantities of water up to their maximum capacities, or in such other manner as may be suitable to accomplish this purpose.

(16) Should ice interfere with navigation, due to the presence of the compensating works, the board shall take measures to obviate this difficulty, and may call upon the owners of the said works to do any work necessary for this purpose.

(17) Should currents which unduly interfere with navigation be developed by the operation of the power works on either side of the river, the power company operating said works shall alter them or construct such other works as its Government may deem necessary to remedy this evil and in a manner approved by such Government.

(18) It is recommended that the cost of maintaining all parts of the compensating works shall be borne by the respective owners thereof, and that this work of maintenance shall be done in a manner satisfactory to both Governments. It is also recommended that the rules devised by the board for the operation of the compensating

works shall be framed so as to divide this burden between the owners of the component parts of the entire system as nearly as may be in proportion to the amount of primary water used for power development on each side of the international boundary.

(19) Should either or both Governments acquire title to the compensating works built in their respective territories, the approval of the construction and maintenance of these compensating works by the applicants shall inure to the benefit of their respective Government successors.

(20) In the event of a disagreement between the members of the board herein constituted with respect to the interpretation of the conditions attached to this order of approval, or to the duties and powers of said board, or to the details of the operation of the compensating works, the question at issue, upon the application of either Government, shall be referred to this commission for its recommendation.

(21) "Primary water" as used herein shall be understood to mean the amount of water which is continuously available for use for power purposes. "Secondary water" shall be understood to mean an amount of water, over and above that designated as primary water, which is intermittently available for use for power purposes.

XVIII.

(c) In connection with the power interests involved in the present applications it may be convenient to trace briefly the history of water-power development on both sides of the St. Marys River at Sault Ste. Marie previous to the present applications. In 1887 the Edison-Sault Light & Power Co. (afterwards the Edison-Sault Electric Co.) was organized for the purpose of developing water power on the American side of the river, the adjoining lands having been acquired in 1883 by William Chandler. In 1888 a canal about 2,200 feet long was dug through this property by the Edison Co., the power developed being used locally, mainly for electric lighting. By permits granted this company by the Secretary of War in 1889 and subsequent years the company was enabled to gradually increase its use of water, which may reach a maximum of about 5,200 second-feet of water under the lease of June 25, 1912. The other principal corporation on the United States side of the river, the Michigan Lake Superior Power Co. (now the Michigan Northern Power Co.) was, as already mentioned, organized in 1898. This company purchased the right of way of the St. Marys Falls Water Power Co., which about 1887 had begun excavation for a canal through the town of Sault Ste. Marie, Mich., from a point above the ship canal to the river below, but had subsequently failed. Its later history has already been given.

In June, 1888, the Sault Ste. Marie Water, Gas & Light Co., with interests on the Canadian side of the river, was incorporated under the laws of Ontario. The following year the name of the company was changed to the Ontario & Sault Ste. Marie Water, Light & Power Co., and it was given power to build dams across the inland channels or rapids of St. Marys River or any branch thereof within the Province of Ontario, and to construct other necessary works. In 1895 the Lake Superior Power Co. took over the property of the former

company, which had become financially embarrassed, and the following year obtained a grant of a portion of St. Marys Island opposite the rapids in exchange for certain other lands in the town of Sault Ste. Marie, Ontario. The Consolidated Lake Superior Co. was formed in 1901 to control the interests of the Lake Superior Power Co., the Michigan Lake Superior Power Co., and other allied corporations. In 1904 it was reorganized under the name of the Lake Superior Corporation. The Algoma Steel Corporation was incorporated May 10, 1907, under the name of the Lake Superior Iron & Steel Co., which was changed to the present name on April 1, 1912. On or about the same date the Algoma Steel Corporation acquired all the property, franchises, and rights of the Lake Superior Power Co.

While dealing with the power situation in the St. Marys River it seems desirable to consider the potential value of the entire available flow, developed under varying conditions. It is agreed that 60,000 second-feet of "primary" are available under all conditions, and that 10,000 second-feet of "secondary water" are intermittently available. This "secondary water" will be available for an average period of six months per annum, so that we have the equivalent of 5,000 second-feet the year round, which added to the 60,000 feet of "primary water" gives a total of 65,000 second-feet continuously available. This quantity of water used under an average head of 18 feet would produce about 106,000 continuous electrical horsepower. If this quantity of power were developed by steam or heat engines, or by any means other than water, the cost would be from \$30 to \$35 per horsepower per annum, while the same quantity generated by water might effect an annual saving of about \$1,000,000.

XIX.

For a clear understanding of the existing situation, so far as the compensating works asked for in connection with the pending applications are concerned, it will be well to give a brief account of the history of previous structures of a similar nature in the St. Marys River and their effect upon the levels of Lake Superior.

The first structure placed in the St. Marys River, thereby affecting the free flow out of Lake Superior, was the international bridge in 1888. Then in 1892 the Chandler-Dunbar Water Power Co. cut off by a dike a considerable section of the rapids. Later in 1901, when the Michigan Lake Superior Power Co.'s waterpower canal was under consideration, the United States War Department decided that before that canal would be allowed to draw water from the river above the falls compensating works should be placed in the river. The open channel was thereby further restricted in its discharge capacity by the four Stoney sluiceways on the Canadian side of the boundary; these have never been put into commission, as the breakwater on the

upper side of the gates is still in place. These gates with a short piece of dike joining them at the Canadian shore at an elevation of 603.6 will obstruct the flow by about 12,900 cubic feet per second, but that obstruction has practically been taken care of since January, 1905, when the Michigan Lake Superior Power Co. began to extract about 8,500 cubic feet per second, which has since been increased to about 10,500 cubic feet per second.

XX.

The outcome of these various interferences with a free flow of the river, as determined by the International Waterways Commission, which made an exhaustive study of the levels of the Great Lakes, is that the mean level of Lake Superior between 1888 and 1905 was raised about 1 foot, and since the latter date, through the withdrawals of water by power canals, that artificial storage of Lake Superior has been slightly reduced, and with the putting into commission of the three United States Government sluices to be further reduced to about six-tenths of a foot.

To give a clearer idea of conditions at the Sault, in the state of nature, as well as present conditions, and those that should follow the proposed regulation, the following three tables have been prepared, partly from the evidence presented to the commission and partly from the reports of United States lake surveys and of the International Waterways Commission. Three maps showing the situations in the St. Marys River under natural conditions, as well as under the present and proposed development, are also attached.

In the preparation of these tables six elevations of Lake Superior have been used, as follows:

- (1) 602.1 and 603.6 feet, the limits, as far as feasible, of regulation recommended by the engineers of both Governments.
- (2) 602.6 feet, the mean level which it is expected the above regulation will produce.
- (3) 603.93 and 604.08 feet, the highest mean monthly levels from 1860 to date; the first in August, 1876, and the latter in September, 1869.
- (4) 602.27 feet, the mean level 1860 to 1913, inclusive.

TABLE I.—*Natural conditions at Sault Ste. Marie (prior to 1888).*

Lake Superior levels.	Width of main channel.	Cross section of discharge area.	Full discharge from lake.
	<i>Feet.</i>	<i>Square feet.</i>	<i>Cubic feet per second.</i>
602.1 feet.....	2,380	13,300	82,040
603.6 feet.....	2,390	16,900	116,600
603.93 feet (1876).....	2,395	17,700	121,100
604.08 feet (1869).....	2,400	18,100	128,700
602.27 feet (mean of 54 years).....	2,383	13,690	85,880
602.60 feet (mean under regulation).....	2,385	14,500	93,560

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S A U L T S T _ E M A R



C A N A D A



R I E

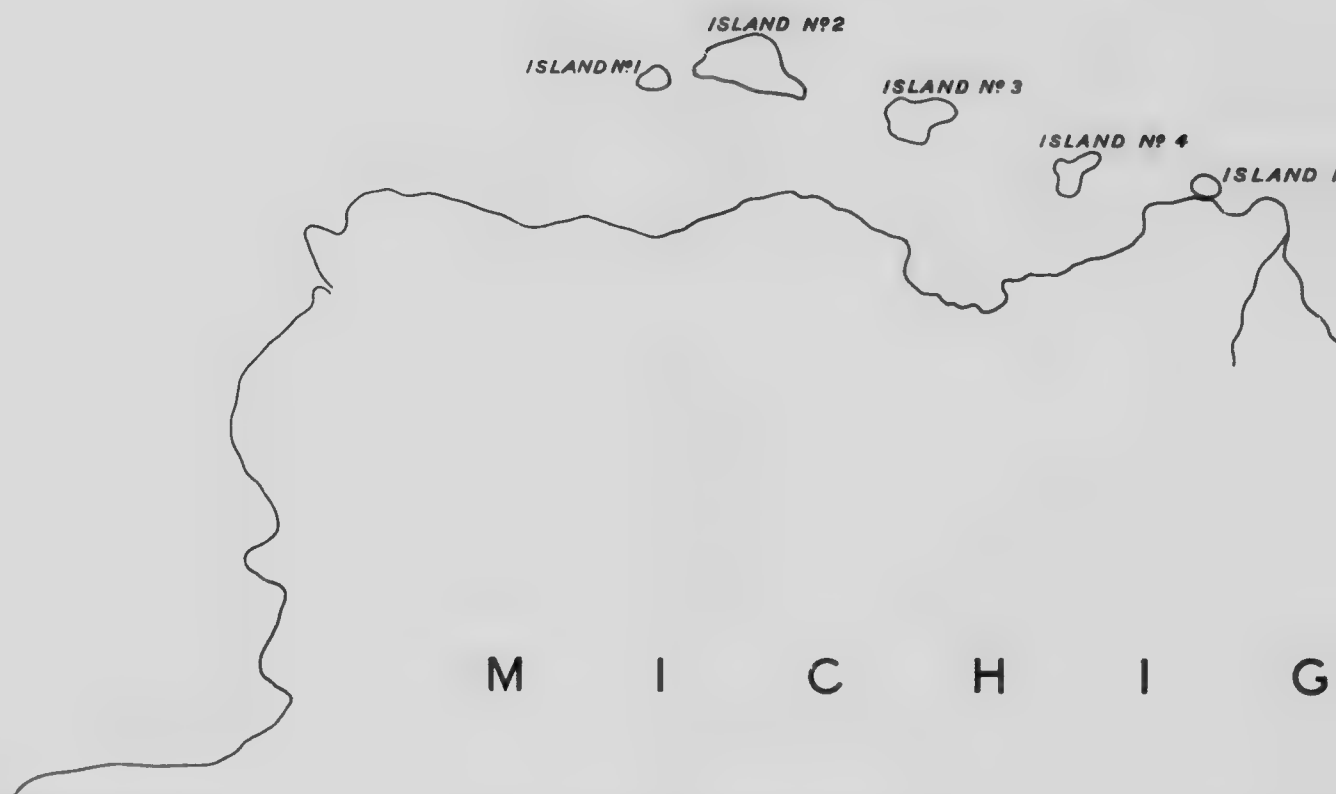


ISLAND No 5





S A U L T S T _ E M A R



(From map prepared by the International Boundary Commission under the Sixth Article of the Treaty of Ghent, 1819.)



R I E

ISLAND N° 5

G A N

International Joint Commission
ST. MARY RIVER
AT
SAULT STE. MARIE
NATURAL CONDITIONS
To accompany Table I.

Scale
0 500 1000 FT











International Joint Commission
ST. MARY RIVER
AT
SAULT STE. MARIE
EXISTING DEVELOPMENT

To accompany Table II.

Scale

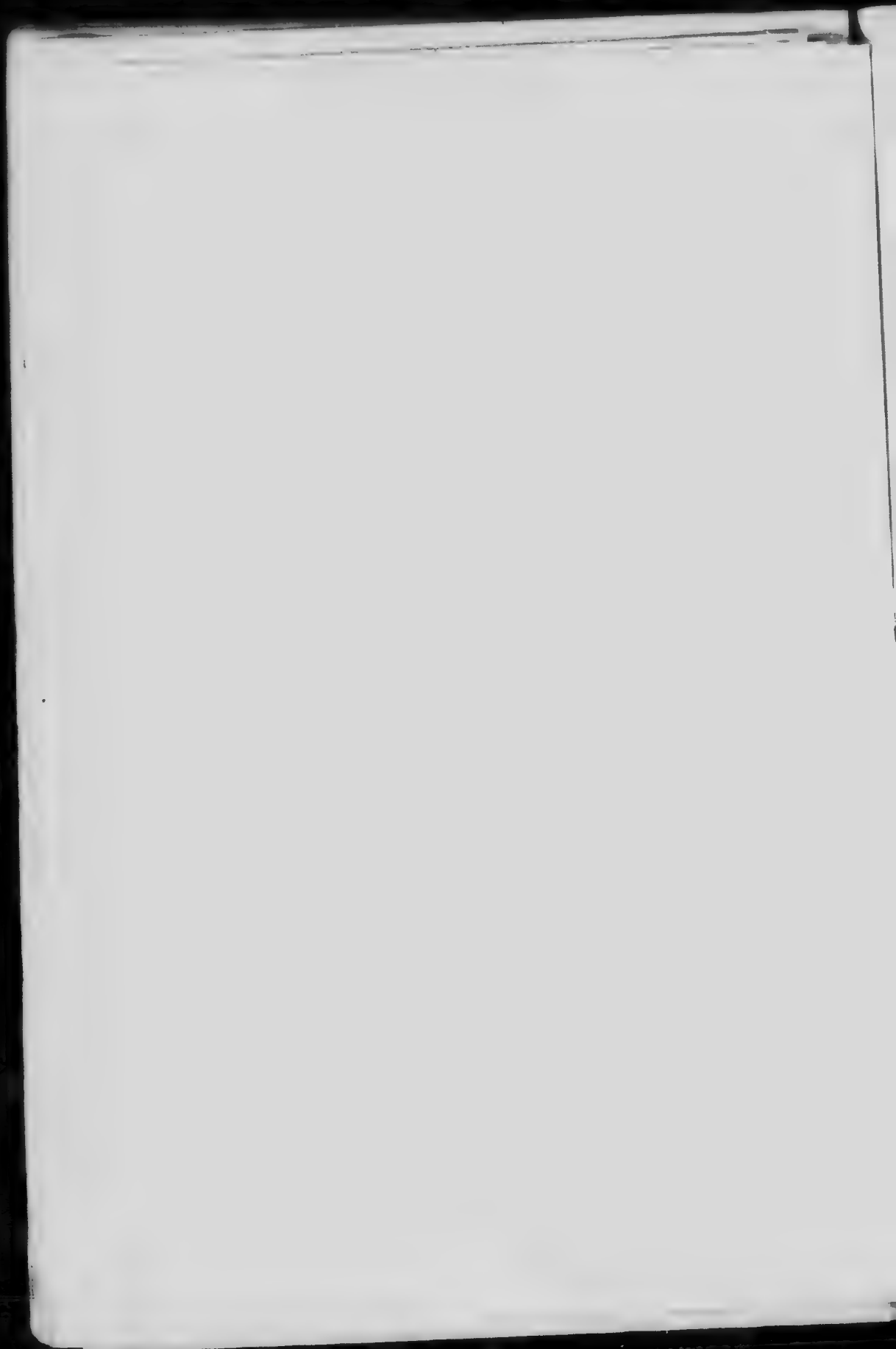


TABLE II.—Conditions in Sault Ste. Marie, 1913—4 Canadian gates closed.

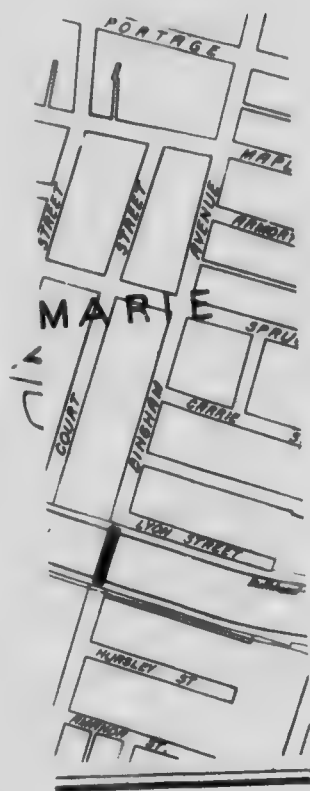
Lake levels.	Width of outlets.				Cross section.					Discharges.								
	Open chan- nel.	3 United States Govern- ment sluices.	Michi- gan North- ern Power Canal.	Algoma Steel Power Canal.	Total.	Open chan- nel.	3 United States Govern- ment sluices.	Michi- gan North- ern Power Co.	Algoma Steel Power Co.	Thru turbines in addi- tion to flow through 3 United States sluices.	Total	Open channel spans 5-6-7-8 of inter- national boundary.	3 United States Govern- ment sluices.	Michi- gan North- ern Power Co.	Algoma Steel Power Co.	Edison Sault Power Co.	Navi- gation.	Total.
Feet.	Feet.	Feet.	Feet.	Feet.	Square feet.	Square feet.	Square feet.	Square feet.	Square feet.	Square feet.	Square feet.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.
902.1 feet.....	935	105	200	85	1,305	6,600	1,260	3,600	1,325	.....	15,500	50,500	11,900	12,000	8,000	1,000	1,000	84,400
903.60 feet.....	935	105	200	85	1,305	7,630	1,470	3,960	1,460	.....	17,080	71,300	15,700	12,000	8,000	1,000	1,000	109,000
903.13 feet.....	935	105	200	85	1,305	7,720	1,500	3,960	1,490	.....	17,370	75,900	16,500	12,000	8,000	1,000	1,000	114,400
904.08 feet.....	935	105	200	85	1,305	7,825	1,520	4,000	1,500	.....	17,580	78,000	16,900	12,000	8,000	1,000	1,000	116,900
902.27 feet.....	935	105	200	85	1,305	6,710	1,270	3,640	1,340	.....	15,670	52,800	12,400	12,000	8,000	1,000	1,000	87,200
902.60 feet.....	935	105	200	85	1,305	6,860	1,300	3,700	1,370	.....	16,060	57,430	13,200	12,000	8,000	1,000	1,000	92,600

NOTE.—By the removal of the remedial works in front of the 4 Canadian sluice gates and thereby bringing into commission these gates, it will be possible to build the cofferdam for the erection of the first 4 gates on the United States side of the boundary without altering the present discharge capacity at the Sault Ste. Marie.

TABLE III.—Conditions expected to follow construction of proposed works—4 Canadian gates in commission.

Lake levels.	Width of outlets.					Cross section.				Discharges.			
	16 sluices.	3 United States Government sluices.	Michigan Northern Power Canal.	Algoma Steel Power Canal.	Total.	16 sluices.	3 United States Government sluices.	Michigan Northern Power Co.	Algoma Steel Power Co.	Through turbines in addition to flow through 3 sluices.	Total.	16 sluices.	3 United States Government sluices.
Fect.	Fect.	Fect.	Fect.	Fect.	Square feet.	Square feet.	Square feet.	Square feet.	Square feet.	Square feet.	Square feet.	Cubic feet per second.	Cubic feet per second.
602.10 feet.....	835	105	200	200	1,440	8,350	1,250	3,000	1,325	14,325	44,000	11,900	11,900
603.60 feet.....	835	105	200	200	1,440	8,350	1,470	3,900	1,460	15,180	59,000	15,700	15,700
603.95 feet.....	835	105	200	200	1,440	8,400	1,500	3,960	1,480	15,340	62,700	16,700	16,700
604.08 feet.....	835	105	200	200	1,440	8,450	1,520	4,000	1,500	15,470	63,100	16,900	16,900
602.27 feet.....	835	105	200	200	1,440	8,350	1,270	3,640	1,340	14,600	46,200	12,400	12,400
602.60 feet.....	835	105	200	200	1,440	8,350	1,300	3,700	1,370	14,720	49,500	13,200	13,200

Lake levels.	Discharges.					Navigation.		Total discharge.
	Algoma Steel Corporation.				Edison Sault.	Total.		
	Present.	Increase.	Total.	Capable of immediate increase.			Further increase.	
602.10 feet.....	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	Cubic feet per second.	
603.60 feet.....	12,000	13,000	25,000	7,000	15,000	30,000	2,000	
603.95 feet.....	12,000	23,000	35,000	7,000	20,000	35,000	1,000	
604.08 feet.....	12,000	23,000	35,000	7,000	20,000	35,000	1,000	
602.27 feet.....	12,000	18,000	30,000	7,000	20,000	35,000	1,000	
602.60 feet.....	12,000	18,000	30,000	7,000	20,000	35,000	1,000	











International Joint Commission
 ST. MARY RIVER
 AT
 SAULT STE. MARIE
 PROPOSED DEVELOPMENT

To accompany Table III.

Scale
 0 100 200 300 400 500 600 700 800 900 1000

TABLE III — *Conditions expected to follow construction of proposed works—4 Canadian notes in commission*

These tables show that when a lake stage is reached of 602.27 and over, that the outlet, St. Marys River, as it exists to-day, is not as effective for taking care of the discharge as it was under natural conditions while the suggested development, to which further reference will be made, gives much greater opportunity to carry off the lake supply during high stages.

In considering the question of water levels, it is recognized that the ideal condition would be a fixed level, but in actual practice that condition is unattainable. Lake Superior is the largest of the world's fresh-water seas, and no human power can control its fluctuations except to a very limited extent. It remains therefore to consider how this limited control may be so exercised as to give the maximum protection and advantage not only to the various existing interests concerned but also, bearing in mind the possible development of a vast area of country surrounding Lake Superior, to future interests. It has been demonstrated that, while no very great improvement is possible in the fluctuations over those that prevailed under natural conditions, the range may be shifted up or down by suitable regulation of the compensating works in the St. Marys River; that is to say, a high or a low mean may be established, and the water of the lake will fluctuate to points above and below that mean. It is evident that if the range of fluctuation is held up the lowlands around the lake will be more or less flooded, while if it is kept down the depths in the harbors, rivers, and canals will be reduced. The problem, then, is to obtain a mean which, while doing no material injury to riparian interests, will effectually safeguard the paramount interests of navigation. In arriving at that mean it is to be considered that the period of navigation lies within the summer months, and that the first consideration is to secure during those months levels that will meet the requirements of navigation, while it is of comparatively minor importance to navigation what levels are maintained through the winter months, except in so far as the winter stage of water may affect the levels in the succeeding summer.

Briefly, the situation at the Sault is that the free flow over the rapids has been checked by fixed obstructions, and notwithstanding the withdrawal of water by the power canals, the mean stage now stands, as previously stated, something over a foot higher than under natural conditions. These fixed structures in the channel merely create new levels in the lake above, with practically the same fluctuations, while movable ones will permit a control that will tend to modify the range of oscillation.

An examination of the mean monthly levels which have obtained since the earliest date of continuous records, 1860, down to the present time, throws an interesting light on the extent of the fluctuation above and below the stages recommended by the engineers, 603.6

and 602.1 feet. It is found that upon four occasions only, namely, September, 1869, and July, August, and September, 1876, did the monthly mean levels exceed 603.6 feet. On the other hand, during the winter months—December, January, February, and March—the mean monthly levels have dropped below 602.1 feet 126 times in a possible 215. The situation throughout the same long period was not as bad during the other eight months, the navigation season, the occasions being 123 in a possible 428, as follows:

In the months of—	Times.
April, 1860, to date.....	40
May, 1860, to date.....	26
June, 1860, to date.....	15
July, 1860, to date.....	10
August, 1860, to date.....	7
September, 1860, to date.....	6
October, 1860, to date.....	9
November, 1860, to date.....	10
Total.....	123

These facts and figures show clearly that under the natural conditions the mean level would be somewhat lower than the proposed regulated mean, to the detriment of the important navigation interests and the lake ports dependent thereon.

Suggestions were advanced that the range might be confined to narrower limits than the 1½-foot range put forward by the engineers. Under natural conditions the greatest fluctuation has been about 3½ feet, and considering the vast area of Lake Superior, about 32,000 square miles, exclusive of its surrounding catchment area, it is evident that abnormal rain conditions have seriously taxed the capacity of the outlet in its natural state, and will continue to do so, though to a lesser degree under any artificial conditions that might be developed at Sault Ste. Marie with a reasonable expenditure of money.

In this connection, Col. Patrick, of the United States Army Engineers, referring to the high level, 604.08 feet of 1869, said "if the same condition of rainfall and supply to the lake should recur, as there is every reason to believe it will recur at some time, nothing on earth can prevent the lake surface going back to that level." In fact, Col. Patrick believes that at times the lake will fluctuate half a foot above 603.6 feet and a similar distance below 602.1 feet, the low limit of the suggested range or an extreme fluctuation of 2½ feet, which is a foot less than under conditions that have prevailed in the past.

The late Mr. Alfred Noble in evidence stated, "I am clearly of the opinion that no works can be devised by which the variations of the lake can be held within an absolute range of one foot and a half," but he admitted that it could be done "within two feet and a half."

Mr. W. J. Stewart, representing the Government of Canada, stated, "now looking for the limits of level between which the lake should be held, there were two points to consider; one was the cutting out of the extreme low waters during navigation season, and the other was to prevent the level of the lake rising to a height that might injure the low lying lands in the vicinity of Fort William." Mr. Stewart "thought that 603.6 feet should be the upper limit, and except in years when conditions were similar to the two extreme high water years, regulation should be kept within the upper limit." He added that any attempt at a system of regulation which would have the effect of keeping such extreme conditions as prevailed in those two years below 603.6 feet, would produce "a very much lower limit to the injury of our canals (navigation) in both countries at Sault Ste. Marie."

The two following tables will help to illustrate and confirm the difficulty that stands in the way of a close regulation of the levels of Lake Superior:

Table showing the difference between the extreme monthly means in the following years.

Year.	Feet.	Year.	Feet.	Year.	Feet.	Year.	Feet.
1860.....	1.68	1874.....	1.28	1888.....	1.65	1902.....	1.01
1861.....	1.35	1875.....	1.24	1889.....	1.04	1903.....	1.47
1862.....	1.02	1876.....	1.89	1890.....	1.41	1904.....	1.42
1863.....	.87	1877.....	.67	1891.....	.66	1905.....	1.00
1864.....	.65	1878.....	.65	1892.....	1.24	1906.....	.87
1865.....	1.75	1879.....	.97	1893.....	1.64	1907.....	1.37
1866.....	1.41	1880.....	1.79	1894.....	1.75	1908.....	1.27
1867.....	1.15	1881.....	1.33	1895.....	1.33	1909.....	1.04
1868.....	1.13	1882.....	.93	1896.....	1.26	1910.....	.54
1869.....	2.67	1883.....	1.03	1897.....	1.34	1911.....	1.61
1870.....	.63	1884.....	1.00	1898.....	1.42	1912.....	1.29
1871.....	1.27	1885.....	1.32	1899.....	1.84	1913.....	1.26
1872.....	1.85	1886.....	.95	1900.....	1.40		
1873.....	1.50	1887.....	1.19	1901.....	1.09		

Table of supplies to Lake Superior, 1860 to 1907, inclusive.

Month.	Average.	Highest.	Lowest.	Range.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
January.....	+0.007	+0.240	-0.139	0.379
February.....	+ .086	+ .618	- .126	.744
March.....	+ .196	+ .623	- .185	.808
April.....	+ .398	+ .776	- .214	.990
May.....	+ .517	+ .862	+ .121	1.013
June.....	+ .490	+ .856	+ .263	1.119
July.....	+ .431	+ .708	+ .233	.941
August.....	+ .351	+ .680	+ .110	1.030
September.....	+ .275	+ .579	+ .019	.596
October.....	+ .115	+ .440	- .066	.526
November.....	+ .021	+ .202	- .293	.463
December.....	+ .032	+ .196	- .313	.500

Column two in the above table shows the effect on lake levels of the average monthly supply during 48 years.

Column three shows the effect on lake levels of the highest monthly supply during 48 years.

Column four shows the effect on lake levels of the lowest monthly supply during 48 years.

Column five gives some indication of the variableness of the supply and the difficulty therefore in setting discharge gates at the Sault from time to time to take care of water conditions before they exist.

That navigation is the paramount interest in the use of the waters of the St. Marys River is a proposition that can hardly be disputed. The waterways treaty, in setting forth the order of precedence to be observed among the various uses of boundary waters, puts navigation before power, and lays down the definite rule that "no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence." The commission is bound, therefore, under the terms of the treaty, to see that in approving the use of these waters for power purposes, that use is not permitted to materially conflict with or restrain their use for the purpose of navigation. But even if this obligation were not imposed upon it by the treaty, the commission could hardly avoid the conclusion that navigation must have first consideration. The power interests at Sault Ste. Marie, while unquestionably important, are necessarily limited in their use and development. The interests of navigation, on the other hand, are broad enough to embrace not merely the enormous commerce of the Great Lakes as it exists to-day, involving in one way or another the comfort and welfare of millions of people on both sides of the international boundary, but they are susceptible under favorable conditions of practically unlimited development. The applications, therefore, should be regarded not so much as a proposition to provide additional water for power development in the St. Marys River as an opportunity to create such conditions in that river that not merely the present, but the prospective, needs of navigation will be given the fullest possible measure of protection and encouragement. The outflow should be regulated primarily and essentially in the interests of navigation and of the lake ports depending thereon, and that is unquestionably the attitude of both Governments. The United States will become the owner in fee simple of the works to be built by the Michigan Northern Power Co. on the United States side of the boundary. The Canadian situation, however, is not so definite. The Algoma Steel Corporation has authority to build its works with the rider that the Canadian Government may step in at any time and acquire them by arrangement.

The St. Marys River is the most important link in the greatest system of inland waterways in the world, and it is open to serious question whether private capital should be allowed to create, even

for a limited time, works which if built should be under governmental control absolutely and primarily for the benefit of navigation—in other words, whether these regulating works should be built as an incident in the development of water power, or if it is not a sounder policy for the Government to build them or acquire them as soon as they are built, and thus make the development of power an incident to the larger work of caring for navigation. At the same time the public may fairly expect a return for the use of so much of this water which passes down out of Lake Superior as is not needed for navigation. The hope is, therefore, expressed that the Canadian Government will provide at once for the acquisition and absolute ownership of the works proposed to be built on the Canadian side of the boundary.

As already indicated, it would be to the advantage of every interest concerned if the range of the fluctuation of the lake levels were restricted as much as possible. The suggested regulation as far as possible within the limits 603.6 and 602.1 feet was worked out by the United States Army engineers in 1902 and made effective in the lease of water to the Michigan Lake Superior Power Co. in the same year. This regulation was afterwards approved by the International Waterways Commission, so that on three different occasions in the study of conditions at the Sault by most competent engineers they all reach the same conclusions as to attempted regulation of the outflow from Lake Superior.

In view of the foregoing statement of facts, the undersigned begs to submit for the consideration of the commission the following recommendations, which it is suggested might be submitted to the two Governments in connection with the commission's order of approval:

(1) That the officer of the Corps of Engineers charged with the improvement of the Falls of the St. Marys River on the United States side, and an officer duly appointed by the Government of the Dominion of Canada, shall form a board to formulate rules under which the compensating or remedial works and the power canals and plants, including headgates and by-passes, shall be operated to secure as nearly as may be the regulation of Lake Superior as provided for in the order of approval.

(2) That the respective Governments should immediately bring to the attention of the International Waterways Commission, charged with the delimitation of the international boundary in the St. Marys River, the desirability of establishing that boundary through one of the piers of the proposed sluice gates. The plans of these gates, as approved by both Governments, indicate a width of gate that will bring certain of the piers immediately above those of the International Bridge, in order evidently to lessen as far as possible interference

with the flow below the gates. As these gates are about 52 feet wide, the maximum distance the boundary would have to be moved would be 26 feet. It would obviously not be desirable to have the boundary pass through one of the gates, part of which would then be in the territory of one country and part in that of the other. Therefore, if necessary, it would seem desirable, for a distance of, say, 50 feet up and down stream from the gates, that the boundary should be adjusted to the gates rather than the gates to the boundary.

(3) That the cost of maintaining all parts of the proposed compensating or remedial works shall be borne by the respective owners thereof, and shall be done under the direction of, and in a manner satisfactory, to both Governments. Also that the rules devised by the board for the operation of these works shall be so framed as to divide this burden equally between the owners of the component parts of the entire system.

The undersigned is of the opinion that the order of approval should include the following provisions respecting construction, operation, and control of the proposed works:

The proposed diversion of water from, and the construction of compensating works in, the St. Marys River at Sault Ste. Marie, by the Michigan Northern Power Co. and the Algoma Steel Corporation (Ltd.), their successors and assigns, with the plans as amended and finally approved by the Secretary of War of the United States, and the Governor General in Council of the Dominion of Canada, are hereby approved on the following conditions:

(1) The works to be built in the St. Marys River at Sault Ste. Marie by the Michigan Northern Power Co. and the Algoma Steel Corporation (Ltd.), their successors and assigns, shall consist of a dyke about 200 feet long, and 12 Stoney sluice gates, each gate to be about 52 feet in the clear, the details as shown on the plans approved by the Secretary of War of the United States, and the Governor General in Council of the Dominion of Canada. These works shall extend from the United States Government dyke immediately above Pier No. 4 of the International Bridge northward to the southerly limit of the Stoney sluice gates now in place on the Canadian side of the river.

(2) The Michigan Northern Power Co. shall build the said dyke about 200 feet in length and all Stoney sluice gates and their appurtenances northward to the international boundary; and the Algoma Steel Corporation (Ltd.) shall build all the gates on the Canadian side of the river between the gates now in place and the international boundary.

(3) The sills of all Stoney gates on the United States side shall not be higher than 591.2 feet and of all such gates to be built in

Canada (in view of the main channel being on that side of the boundary) not higher than 590.7 feet, according to the system of levels established by the United States in 1903, and the river bed, both upstream and downstream from the works so to be built, to a distance to be determined by the board, whose appointment has been recommended, shall be excavated at least one-half foot lower than the intervening sills.

(4) The Secretary of War of the United States or such officer as he may designate shall approve of all the detailed plans for such portion of the works as will be within the territory of the United States, and the Governor General in Council of the Dominion of Canada, or such officer as he may designate, shall likewise approve of all the detailed plans of such portion of the works as will lie within Canadian territory. The works shall be commenced within three years and shall be carried on with due diligence to the satisfaction of the said board.

(5) The order in which the works are to be proceeded with, subject to the approval of the Secretary of War, or such officer as he may designate, and the governor general in council or such officer as he may designate, in respect to such portions of the works as may lie within United States and Canadian territory, respectively, shall be:

(a) The removal by the Algoma Steel Corporation, Ltd., of its dyke above the four sluices, and immediately thereafter the testing of the gates to ascertain that they are in proper working order.

(b) The testing of the three United States Government sluices, making them available for immediate use.

(c) The necessary alterations in the Michigan Northern Power Co.'s plant so as to permit the efficient use of the diversion applied for.

(d) The channel of the stream not to be closed at any time by more than one cofferdam of a sufficient size for the construction of a set of four Stoney sluice gates.

(e) The construction of the dyke immediately to the south of the gates on the United States side not to be proceeded with until facilities exist on the Canadian side to fully take care of Canada's half share of all the water.

(f) The further order of construction of the works to be determined by the board, with the approval of the Secretary of War and the governor general in council.

(6) The board shall guard against any undue rise of Lake Superior during the construction of the compensating works by requiring the power companies to pass through their respective canals quantities of water up to their maximum capacity, or in such other manner as may be suitable to accomplish this purpose.

(7) All compensating works heretofore built and all such works built under this order of approval and all power canals and plants including head gates and by-passes, shall be so operated as to maintain the level of Lake Superior as nearly as may be between levels 602.1 and 603.6 feet above mean tide at New York, according to the system of levels established by the United States Government in 1903, and in such a manner as not to interfere with navigation. The operation of all the said works, canals, head gates, and by-passes for the above purpose shall be under the direct control of the board.

(8) The mean elevation of Lake Superior shall be ascertained by taking the mean of the readings of at least four automatic gauges, half the number to be maintained by the United States and half by Canada; these gauges to be located so that their combined readings will indicate as nearly as may be the mean or average condition of the whole lake. The records of these gauges shall be furnished to the board at such intervals as it may require.

(9) To guard against unduly high stages of water in—

(a) Lake Superior, the rules formulated by the board, when tested by the physical conditions which existed during any year of recorded high water in Lake Superior when the monthly mean elevation of the lake exceeded 603.6 feet, shall give no monthly mean level of the lake greater than the maximum monthly mean actually experienced in said year.

(b) The lower St. Marys River, the excess discharge at any time, over and above that which would have occurred at a like lake stage of Lake Superior prior to 1887, shall be restricted so that the elevation of the water surface immediately below the locks shall not be greater than 584.5 feet.

(10) Each power company shall keep continuous records, satisfactory to the board, which shall show the quantity of water used by it, and shall furnish to the board, when required, full information from such records.

(11) At all times the board shall determine the amount of primary and secondary water available for power purposes, and shall distribute to the interests in each country a total amount not exceeding one-half of such water. It shall cause the amount of water so used to be reduced whenever in its opinion such reductions are necessary in order to prevent unduly low stages of water in Lake Superior, and fix the amounts of such reductions. *Provided*, That whenever the monthly mean level of the lake is less than 602.1 feet the total discharge permitted shall be not greater than that which it would have been at the prevailing stage and under the discharge conditions which obtained prior to 1887. *Provided further*, Before any flow of primary water on either side of the river is reduced, the use of all secondary water shall be discontinued.

(12) If the compensating works, constructed in accordance with the plans hereby approved, together with those already constructed, can not be operated so as to secure the regulation of the level of Lake Superior as provided herein, they shall be altered so as to provide for a greater flow, and in a manner satisfactory to the two Governments. Whenever it is required that the said works shall be so altered, the greater flow desired shall be secured in equal parts on each side of the boundary line, or the cost of securing the total greater-flow shall be borne equally by the owners of the two parts of the said works.

(13) Should ice interfere with navigation owing to the presence of the compensating works, the board shall take measures to obviate this difficulty, and may call upon the owners of the said works to do any work necessary for this purpose.

(14) Should currents which unduly interfere with navigation be developed by the operation of the power works on either side of the river, the power company operating said works shall alter them or construct such other works as its Government may deem necessary to remedy this evil and in a manner approved by such Government.

(15) Should either or both Governments acquire title to the compensating works built on their respective territories, the approval of the construction and maintenance of these compensating works by the applicants shall inure to the benefit of their respective Government successors.

(16) In the event of a disagreement between the members of the board, with respect to the interpretation of the conditions embodied in this order of approval, or to the duties and powers of said board, or to the construction or operation of the compensating works, the question at issue, upon the application of either Government, shall be referred to this commission.

(17) "Primary water" as used herein shall be understood to mean the amount of water which is continuously available for use for power purposes. "Secondary water" shall be understood to mean an amount of water, over and above that designated as primary water, which is intermittently available for use for power purposes.

C. A. MAGRATH.

MAY 1, 1914.

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